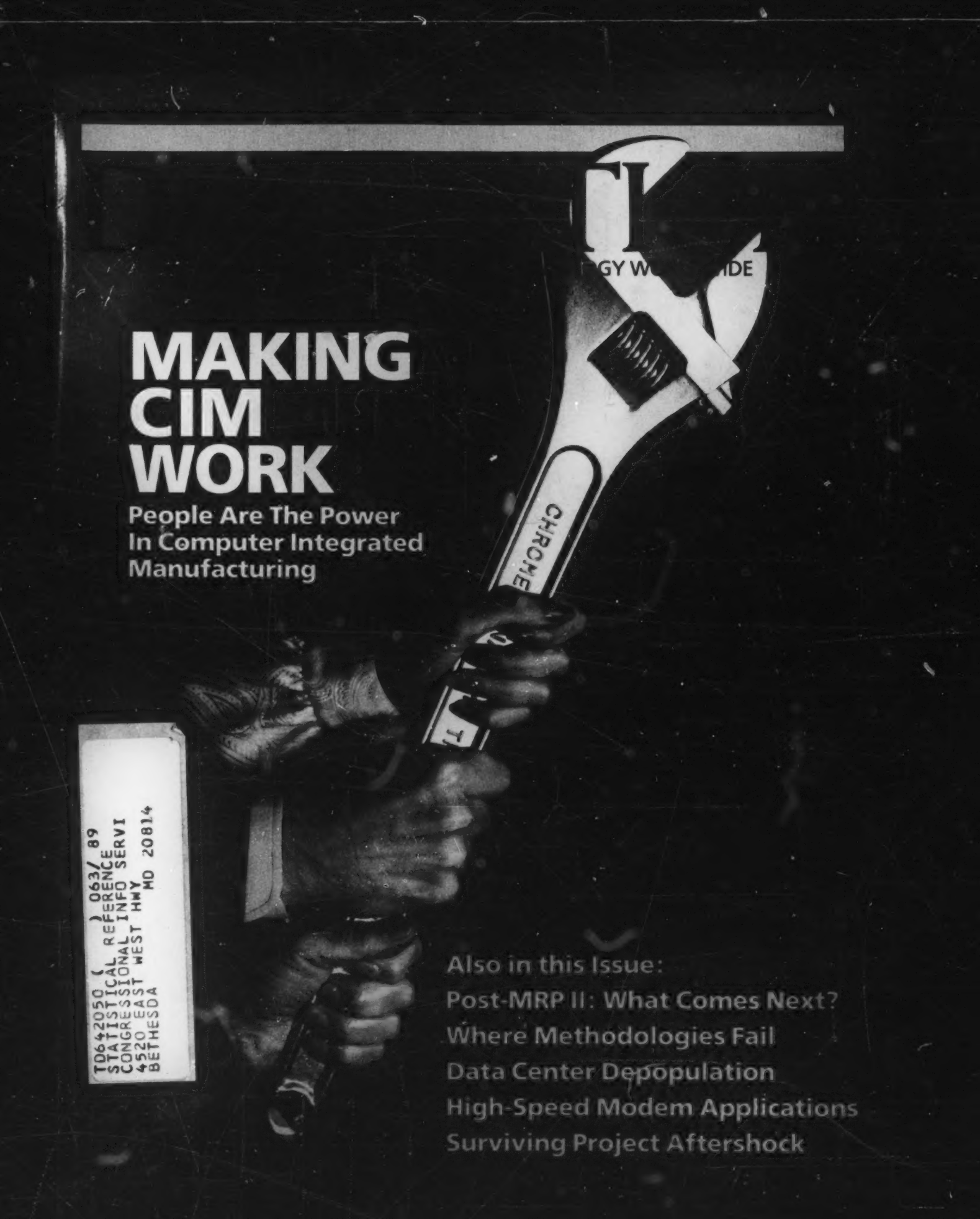
MAKING CIM WORK

People Are The Power In Computer Integrated Manufacturing



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Where Methodologies Fail

Data Center Depopulation

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DATAMATION®

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

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Cover Photography by Peter Neumann

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The Schatz Factor

In this issue's cover story on CIM (page 19), Willie Schatz writes that a successful CIM strategy must be "of the people, by the people, and for the people. . . ." Successful magazines aren't very different. And of the people who contribute the most to DATAMATION's success, few can claim more credit than Willie Schatz. This issue's CIM story is an example of Schatz's skill at telling the stories that matter. Schatz gets the word on CIM from successful users—and, for comparison, tells why some failed to succeed in the past. He talks to vendors, consultants, and academics to fill out the story of this $50 billion-plus automation market.

For more than a decade Schatz has been writing for DATAMATION, first as a freelancer, more recently as Washington Bureau Chief covering government computing, the international technology trade, and, for the past several years, factory automation and supercomputers.

Photograph by Kathryn Lambert

SCHATZ in a rare attitude of repose.

Schatz does more than cover these fields: he wins prizes for the way he covers them. He takes complex technology topics and strips them of pretension and pr hype. Few people in the U.S. know more about the supercomputer industry and the issues it involves than Schatz. In the last two years he has taken home two Neal Awards, the most coveted prizes in trade magazine publishing; and in the most recent Computer Press Association competition, he was cited for writing the Best News Story of the year for a story he broke about Japanese firms "dumping" supercomputers in the U.S.

Away from the PC on which he writes, winning is also important to Schatz, particularly on the tennis court. While he is no stranger to 18-hour days when on a story, there always seems to be time for sports. Schatz is sports-crazed, both as witness and participant. At off-site editorial meetings when other DATAMATION editors are seeking solace from the day's first cups of coffee, Schatz is likely to be finishing his first set of tennis—*after* he's swum his laps—still managing to appear, on-time, for 8:30 a.m. meetings.

Schatz grew up on Long Island, New York, and after getting a law degree, he aimed himself at writing. His first professional writing jobs were—fittingly—covering sports, first freelance for the *Washington Star* and then full-time for the *Miami Herald*. But no matter where he lives or writes, Schatz's loyalties do not easily change: the New York home teams possess his apparently unswervable devotion.

Even more colorful in speech than in print, Schatz has been known to turn the air blue with invective when his high standards for journalism are not met. For the rest of us at DATAMATION, Willie Schatz's insistence on the best is one of the reasons this magazine can, after more than three decades in business, still stake a claim to the loftiest ideals in computer journalism.

—Parker Hodges, Managing Editor

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MAKING

Investments in computer-aided manufacturing are soaring as companies rush to compete globally. But returns on CIM dollars depend more on the people implementing automation efforts than on technology.

BY WILLIE SCHATZ

If a company's computer-integrated manufacturing strategy isn't of the people, by the people, and for the people, there is little chance that it'll increase productivity, lower costs, add efficiency, or deliver any of the other promises associated with factory-floor technology investments.

"CIM is really a cultural change," says Bob Ratcliff, a lead analyst for CIM services at farm machinery maker Deere & Co., which has spent a lot of time working on how to manufacture tractors more efficiently using systems. "It's really a way of life. You're not just changing your computer configuration, you're changing your methodology. You're changing the way you do business. You're changing mind-sets."

Or, as Arthur Andersen & Co. says: simplify, automate, integrate. But that's far easier said than done. CIM doesn't happen overnight. Even when it's properly conceived, a strategy that automates a significant portion of a company's manufacturing operations takes years to implement. "A lot of people are going for the big win," comments Vincent Jones, author of *MAP/TOP Networking* (McGraw Hill Book Co., New York, 1988). "People are always in a rush. Management wants to see the whole problem solved today."

Manufacturing compa

ISSUES 88

This is another in a continuing series of articles addressing new management, organizational, and systems issues that confront IS.

CIM WORK

nies worldwide are pouring vast sums of money into automating their operations. Boston-based Harbor Research Inc. estimates CIM investments will nearly double to $91 billion in 1992 from this year's $52 billion, with transportation companies leading the way.

But before those investments produce the kinds of returns manufacturing executives and their IS counterparts are banking on, companies have to thoroughly examine the entire manufacturing process. "Too many people automate [without thinking about what they're doing]," Jones asserts. "Step one is [for] the company to change its way of thinking. Understand the process, document the process, simplify the process, then automate. Automation is the last step, not the first."

Users agree. "CIM is a journey," says David Rea, director of the manufacturing systems division of Weyerhaeuser Information Systems Div., Tacoma, Wash. "It's a means to an end, not an end in itself. It's not something that you do in a year."

Or maybe even in a decade. Weyerhaeuser has been playing the CIM game since 1978. After an initial skirmish in 1978 and a second round in 1982—both of which were limited by the available technology—the company finally solved its CIM problem in July 1985 with an in-house system called ProSmart. ProSmart, a set of VAX-based software tools (including a database), furnishes real-time production information, as well as considerable savings. In fact, ProSmart has been so effective for Weyerhaeuser, saving more than $1 million annually at its Longview, Wash., pulp and paper mill, that the firm is marketing it commercially. "We made the tool rather than buy it, because we looked at the marketplace solutions and there weren't any [for us]," Rea says.

Today, manufacturers have a much broader choice of commercially available software to use as a base for their CIM efforts, especially in the MRP (material resource planning) II arena (see "Post MRP II: What Comes Next?" p. 24). "CIM programs are more readily available than five years ago," agrees Kreg Brown, vice president, Oriole Software, a CIM software manufacturer in Towson, Md. "Users are saying to vendors, 'Get me the functionality to do my job and we'll worry about the platform later. What software will give me the best benefit for my money? What will it take for me to get and stay competitive?' "

As with everything else in business, investment in manufacturing is driven by competitiveness. But competitiveness means different things for different industries, and that makes for a variety of CIM applications. So it's a question of how, not whether, companies gain a manufacturing advantage. Most still approach CIM with the chief objective of improving the quality of their plant processes and the products they manufacture, according to the 1988 North American Manufacturing Futures Survey conducted by the Boston University School of Management. Also among the top CIM goals of those companies surveyed is the speeding up of development and production, and increasing the flexibility of manufacturing operations.

But none of the companies surveyed are going anywhere in CIM without some serious soul-searching. "Companies have to break old habits so they can take advantage of the new environment," says Jeffrey Miller, professor of operations management at Boston University and director of the survey. "CIM is a process of discovering how to simplify the entire manufacturing process. The best firms aren't even doing MRP any more. Since MRP is really an IT reflection of the entire physical process, they've simplified the environment that MRP controls. A factory that MRP controls is automatically a better factory. It's a question of attacking root causes."

While some companies are able to identify manufacturing problems before they begin to hurt profits, others don't begin to seriously seek CIM solutions until their businesses begin to suffer—either due to external market conditions, internal inefficiencies, or a combination of both.

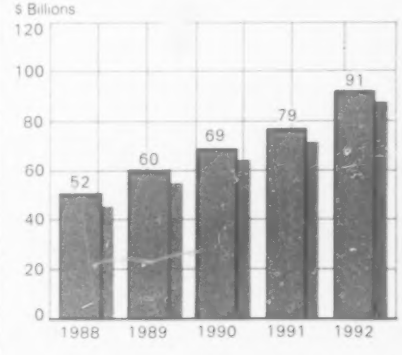
The farm crisis, for example, motivated the $4.1 billion manufacturer Deere to plow into factory automation, albeit late. "We became real lethargic during the '70s," remarks Ratcliff, CIM analyst at Deere's tractor factory in Waterloo, Iowa. "For so long the attitude had been that whatever we did was right, and the marketplace reflected that. So we saw no reason to change it. We were Deere the institution, not Deere the business."

The severity and length of the downturn in U.S. agriculture in the early 1980s forced Deere to focus on its core business. Tractor production had dropped to as low as 10% of the previous level, resulting in layoffs, salary reductions, early retirements, and all the other signs of a business on the brink.

"We took a crash course in CIM," Deere chairman

The Worldwide CIM Market

Manufacturing systems and software sales are projected to double.



Source: Harbor Research Corp.

Photograph by Peter Neumann/Charts by Catherine Francis

DEERE'S RATCLIFF: "CIM is really a cultural change."

and CEO Robert Hanson said at the recent AUTOFACT conference in Chicago. "That's 'crash' as in when the bottom falls out. We were lucky in a perverse sort of way. Other companies see the drip-drip of slowly eroding market share and put off dealing with the inevitable. When you get hit like we did, you can't do that."

Many of the early retirees were succeeded by younger, more aggressive managers who were not afraid to confront Deere's problems. They formed the nucleus of a computer-integrated manufacturing task force, whose sweeping recommendations in 1986 included the formation of a CIM services group comprised of seven members from different quarters at Deere's Waterloo works. The chief suggestion of the task force, which emphasized the merits of decentralized operations, was that the plant's middle managers should find new ways to make their individual departments more productive. Implicit in the task force's thinking was the conviction that there was a need to reform the ways those plant managers obtained information.

"We were taking on a large, powerful centralized mainframe IBM IT shop," says Ratcliff, describing Waterloo's IS dependence on relatively meaningless data generated by IBM mainframes at Deere's headquarters in Moline, Ill. With the CIM initiatives, "we were going to have to redirect the emphasis on how to collect and manage data. Everything in dp was going to have to be by and for the end user, not the systems organization. We had to drive computer ownership, design, and use to the lowest possible level. That meant distributed, localized computing with a great deal of flexibility."

That also meant a totally different approach. "Any change means a fundamental and terrifying attitudinal adjustment," Hanson asserts, "but if your company's going to be competitive, it's got to change its corporate will so it has the gumption to make timely and difficult decisions. We changed not because we were forward looking, but because of the big [competitive] bang.

"Now we're not afraid of change, we can see the forest for the trees and now we know that in manufacturing integration you have to emphasize the people, not the technology. However dazzling the hardware, the 'software' between the ears must be updated first."

And that's not easy. Despite this absolutely top-level support, Deere's progress to date has been slow. "We've spent the last 15 months just getting to the point where some people are listening to us," Ratcliff says. "Classic CIM is our end goal, but a lot has to happen before we put in massive amounts of hardware . . . . The frustration comes because we want to run, not walk. But at least we're moving."

Rolling Out the CIM Carpet

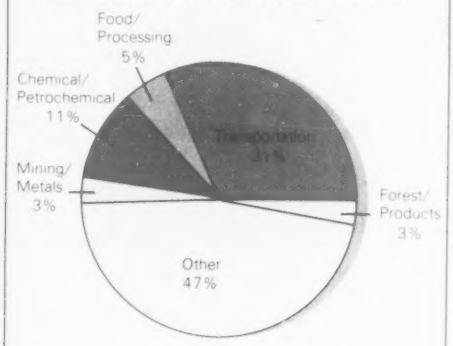
Monsanto Chemical Co.'s journey down the CIM path was faster. Challenged by corporate management in 1984 to increase productivity by 50% in three years, the company's largest manufacturing plant responded by forming three "Plant of the '90s" operating committees that involved every department in the plant—accounting, data processing, research and development, engineering, finance, and operations. Management asked the committees to develop one CIM plan for the site, located on 2,000 acres in Pensacola, Fla., so the costs of implementing it could be factored into capital planning for the next decade.

The committees generated 800 ideas for how to achieve productivity breakthroughs at the plant, which primarily makes nylon carpet yarn. Those ideas were eventually reduced to three key CIM projects, all of which are intended to improve access to systems by any of the plant's 2,500 employees:

- A local area network to integrate the plant's current IBM, DEC, and HP systems, including some 300 PCs. Monsanto so far has invested about $1 million in

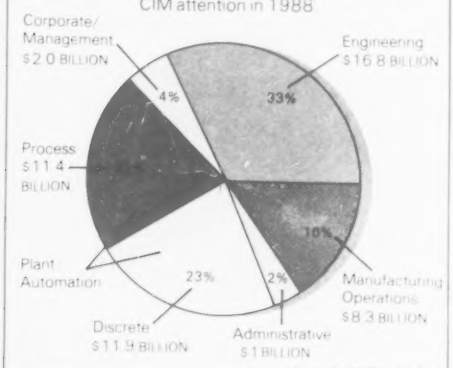
Where CIM Counts Most

Automakers drive factory automation movement.



How CIM Is Applied

Plant automation and engineering attract most CIM attention in 1988.



Photograph by George Cocos, Black Star

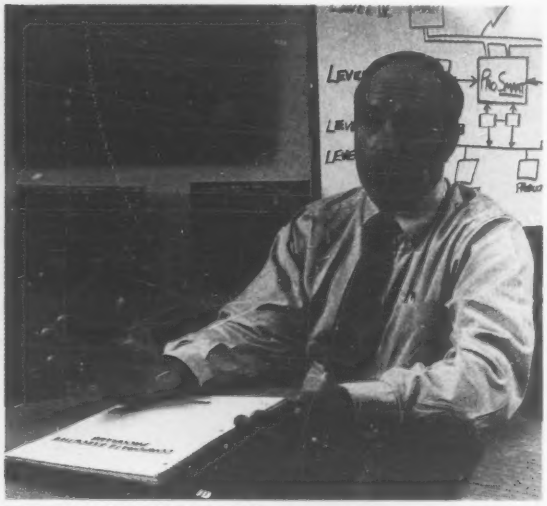
> **"CIM is not a panacea.** It's just another manufacturing tool, a mechanical way of putting people 10 feet away from each other so they can communicate."

Ethernet- and broadband-based networks to do so.

- Separate database management systems for its yarn and chemical product lines. The company has decided to implement Oracle DBMS software as a result.
- A partnership with DEC and Fisher Controls to develop a prototype architecture and application for optimization of all resources at the site.

Monsanto Chemical's plant must be doing something right, because productivity has increased 47% as measured by a complex CIM formula that includes the following variables: raw materials, capital, energy, labor, supplies, and maintenance. Moreover, the company has already recouped some of its CIM investment costs, although the average payout is two or three years.

"The most important part is planning how you're going to be doing business in the '90s," declares Carol Holmes, supervisor of information and systems technology at the Monsanto plant. "Without that cross-functional, visionary plan, we wouldn't have done anything. There were no territorial turf wars and [there was] no jealousy from the dp group . . . [which was] not in a position to set priorities. Those have to be determined by the user groups. If we [had] waited for dp to do it, we'd still be waiting."



WEYERHAEUSER'S REA: "CIM is a journey."

So would Bentley Nevada, an industrial instrumentation maker in Minden, Nev. The company realized there had to be a better way to fly when an audit showed that it took 3,500 blueprints to produce one product—that's about three times too many—and the blueprints took about five times longer than they should have to translate into the product. Trying to get a product to market was like trying to swim through quicksand.

"We'd made a corporate decision that it [automation] was absolutely necessary for us to be competitive in the '90s," says Dave Biggs, Bentley's vice president of product development. "It was becoming pretty obvious that our information system wasn't going to cut it," he continues, referring to the company's $65 million hodgepodge of equipment and software that had been designed for specific functions but that was unable to work together.

"So we decided to analyze what information we really needed [for production]. We discovered that there were real good gains to be made by providing a manufacturing database [developed in-house] that could offer flexibility to other parts of the organization. We never set out to use CIM. We were just looking at improving our production process."

Committing to a Single, Unified Database

Bentley didn't start out with CIM, but by the time it had invested millions of dollars in Compaq 386s, AutoCAD, and CADNETIX software, it had certainly finished with it. The process was hardly painless. Bentley restricted its initial database investments to its engineering departments, which alienated other departments from the CIM cause and yielded little improvement to overall productivity. The company realized its mistake and made a commitment to create a single, unified database that would serve all departments, not just engineering.

"It's absolutely essential that you have one database," Biggs stresses. "If you've got multiple databases, it's a lock that one's wrong. We did an awful lot of grinding on each other until we got the system down. You've got to have an active methodology that promotes the involvement and coordination of all the parties concerned."

Database technology has also keyed Weyerhaeuser's success in CIM, although it experienced two failures in automating its 1,300-worker Longview factory before hitting on its ProSmart solution. "We missed the mark in '78 and '82 because we thought data was the problem," Weyerhaeuser manufacturing director Rea confesses. "With ProSmart we took a people-focused approach, not just a [technological] one. The main business driver was still global competitive pressure, just as [before]. But it was easier the third time because we took the lessons learned and carried them forward."

Unfortunately, a significant number of manufacturers aren't even experimenting enough with CIM to be learning any lessons from it. Many are reluctant to change their ways, especially when some plant capacities in the U.S. are approaching 85%. The old "if it ain't broke, don't fix it" philosophy could be a costly one, however. "Those who pay CIM lip service will continue to be less competitive," networking author Jones warns. "The Japanese don't pay CIM lip service, and they're beating the pants off [U.S. manufacturers].

"Sure CIM is a lot of work," Jones continues, "and it's not a panacea. It's just another manufacturing tool. But the essence of CIM is really very simple. It's a mechanical way of putting people 10 feet away from each other so they can communicate."

Photograph by Doug Wilson/Black Star

Post-MRP II: What Comes Next?

Except for MRP II, users find little packaged wisdom when automating manufacturing. As a result, the pioneers write most such software themselves. But packaged modules are gaining favor.

BY MARY JO FOLEY

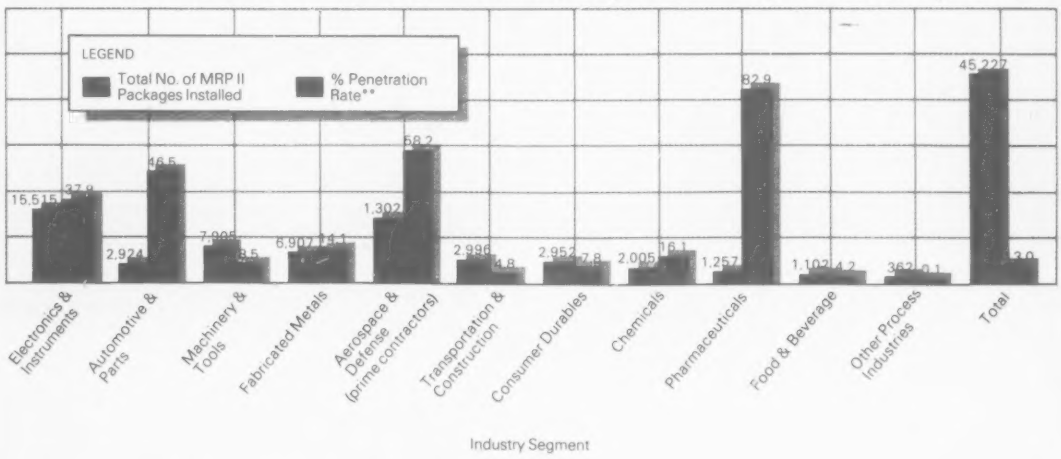
In the discrete manufacturing world, many users have come to equate computer-integrated manufacturing (CIM) with MRP II. However, as automation pioneers are discovering, areas such as quality control, cell control, scheduling, simulation, and maintenance are equally important pieces of the CIM puzzle. Yet, compared with the MRP II world, where packages for all types of users across all price ranges abound, these other segments are in their infancy in terms of the number of application packages available.

As a result, customers have been left to take an ad hoc approach to solving their total manufacturing software needs. Far and away, most are writing the software themselves or working with consultants and/or systems integrators to devise custom solutions. A growing number, however, are testing the market waters by purchasing third-party tools and applications and, in some cases, working directly with developers to tailor the interfaces on those packages to make them more applicable to their operations.

At least in the discrete manufacturing arena, MRP II is often the first type of system customers install. Currently, a sizable portion of U.S. discrete manufacturing companies have some type of packaged MRP II system up and running. (This is not true in the process industries, where MRP II has only recently begun to take hold. The pharmaceutical industry, with an estimated 83% penetration rate, is the only

Which U.S. Manufacturers Use MRP II*

Pharmaceutical firms (82.9%) lead all other segments in use of packaged Manufacturing Resource Planning II software.



* Figures do not include systems developed in-house or extensively customized packaged systems.
** Penetration rate has been adjusted to reflect actual MRP II usage rather than merely vendor-installed base counts.
Source: Plant-Wide Research Corp.

Chart by Paragraphics

TEXAS INSTRUMENTS' LOTT: The flexible manufacturing system that runs TI's factory floor, seen at left, was developed from scratch.

Photographs by Jim Knowles

notable exception.) According to Plant-Wide Research Corp., a North Billerica, Mass.-based market research firm, MRP II penetration rates last year reached 58% among aerospace and defense contractors; 47% among automotive and related parts makers; and 38% among electronics and instruments firms (see "Which U.S. Manufacturers Use MRP II").

It's primarily when users endeavor to move beyond MRP II that they discover the gap between CIM talk and reality. Texas Instruments' Trinity Mills facility in Texas ended up developing its entire Flexible Manufacturing System (FMS) from scratch because of the dearth of off-the-shelf software.

Trinity Mills, a metal fabrication plant, is one of 14 facilities that comprise the company's Defense Systems and Electronics Group. According to the plant's automation manager, Vernon Lott, "third-party software absolutely wasn't available in the case of FMS" when TI first became interested in the concept three years ago. The job was expected to be especially complex because the facility employed factory-floor devices manufactured by so many different vendors that "it was more of a systems integration effort" than a pure software development one, Lott says.

TI already had spent more than five years developing its proprietary corporate-wide MRP II system. A 12-person development team spent a year planning and another year implementing its FMS system. Brought on-line in March 1987, it includes a scheduling system for production control, a cell-control system for coordination, and links between its computer-aided design (CAD) and machine-tool facilities, to name just a few of the modules.

Design time for the FMS was relatively short, thanks to the engineers' use of TI's artificial intelligence programming tools and Explorer Lisp machine in developing the scheduler portions of the system, Lott explains. In addition, he says, quite a bit of the cell-controller technology that TI had perfected at its neighboring Sherman defense facility was transferrable to Trinity Mills. Yet little, if any, of Trinity Mills' FMS is transferrable to other TI plants, since no two TI manufacturing facilities use all the same parts. In fact, another TI plant is running a third-party-developed FMS system, Lott notes.

Packages Gaining Ground

Few users are as thoroughly automated and integrated as TI. Rather, those discrete manufacturers looking to take the next CIM step are likely to add single modules, such as cell control, quality control, scheduling, simulation, process planning, and maintenance, one step at a time.

No two customers seem to agree which of these modules should be brought on-line first, but whatever module they choose, like TI, most are doing a lot of customization work themselves. According to market research firm Automation Research Corp., Medfield, Mass., two thirds of the money that users spend on manufacturing software (including MRP II) is still going for in-house development and/or custom-built software. Among process industries, the amount that users spend on custom software is nearly 80% of their total CIM software expenditures.

Packaged modules other than MRP II have a low level of penetration in manufacturing markets primarily because "the number of commercial packages available is really low" says Alice Greene, president of Plant-Wide Research. "Companies are ending up having to modify them greatly," she adds. In some cases, such as the factory-floor maintenance market, "vendors are pushing the market more than the users." Consequently, maintenance packages are written to reflect a utopia where production and maintenance people work together, although Greene points out that this isn't usually the case within most factories.

It is also because few users have the massive muscle and know-how of a TI that they increasingly are looking at third-party services and products. For instance, when power-supply manufacturer Zytec Corp., Eden Prairie, Minn., called in a consultant for advice on choosing an MRP II system in 1984, the Control Data Corp. spin-off ended up opting for a Xerox Corp. system running on an IBM 4361 mainframe. "The system is doing a half-decent job, but it is limited in terms of tying it into our information system," says

Zytec's systems engineering manager, Damon Whitmore.

When it came time to select other CIM components and processes, Zytec evaluated whether it should go the one vendor route or work with multiple systems integrators. "Even though we knew we would have to do a lot of work in between [linking various vendors' offerings], we decided to contract with several different vendors to create our CIM plan [known in-house as ZYCIM]," says Whitmore, chief architect of ZYCIM. Mainly, this was due to the fact that "there isn't a single vendor that currently can do everything from IS to factory floor, on PCs through mainframes," Whitmore says.

Whitmore is gathering bids from various third-party vendors for the next step in implementing ZYCIM: the development of an electronic link from the company's Cadnetix CAD system to its Hewlett-Packard Co. in-circuit tester. (So far, it has received quotes from Cadnetix and HP.) After Zytec puts its link in place, Whitmore says, it will focus on acquiring an analog-design simulation package for its design engineers. "We're not going to sit here and do any major software development," Whitmore notes. "All of the tools and knowledge already are available to carry us into the 1990s."

Manufacturing Users' Wish List

Cell control, simulation, and scheduling top expected software buys.

Application Type*	1987 User Expenditures ($ Millions)	1992 User Expenditures ($ Millions)	AAGR** %
Cell control	16.4	82.2	38.1
Quality control	20.0	33.7	9.9
Scheduling	34.5	117.3	27.8
Simulation	25.6	90.7	28.7
Process planning	18.7	34.8	25.6
Maintenance	352.6	447.6	13.3

*Data is for packaged systems employed by discrete manufacturing companies only.
**AAGR–Average Annual Growth Rate
Source: Automation Research Corp.

Along with Zytec, computer maker Digital Equipment Corp., one of the foremost U.S. manufacturing experts, seemingly shares the view that many existing CIM tools and applications are sophisticated enough to meet users' needs. At its Chelmsford, Mass.-based Corporate Center for Excellence for Simulation and Modeling, DEC operates a simulation lab for training and development work. The lab runs "most of the [process simulation] software on the market," claims Chris Kuhner, manager of manufacturing expert systems.

"Simulation tools that were available not too long ago required a mathematician to build models," Kuhner continues. "The user interfaces, especially, were extremely unfriendly." As of 1982, DEC had trained only six in-house users in process simulation techniques. "We basically did nothing in the way of simulation. Instead, we used to go out and build plants, and make mistakes." Today, however, "simulation is used in every one of the more than 40 [DEC] manufacturing sites by more than 300 users companywide," he boasts.

DEC relies on simulation tools that were developed by the West Lafayette, Ind.-based Pritsker & Associates, but customized to DEC's specifications. Six years ago DEC linked up with Pritsker to help develop user interfaces that were more applicable to discrete manufacturing operations. Developing these types of fine-tuned, complex software applications is extremely expensive, even for a company the size of DEC, Kuhner says. "We know we can't be all things to all people. To beat this limitation, we partner with third-party developers."

Despite a successful development effort, neither Pritsker's simulation tools nor other off-the-shelf simulation tools offer links between simulation and CAD, Kuhner says. Most such tools also would benefit from improved analytic (especially financial analysis) capabilities, he adds.

"Today, we're seeing great shortening of product life cycles and tighter cost ranges. Product is well controlled," with software like MRP II, "but process [manufacturing] isn't," since companies aren't fully utilizing other manufacturing software, Kuhner asserts.

Mary Jo Foley is a freelance business and technology writer based in Washington, D.C.

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Users Expect Fewer Vendors And Lower Costs

A DATAMATION/Price Waterhouse survey shows that while many European users don't expect the pan-European standardization of 1992 to affect their IS plans, many expect the European IS industry to change.

BY PAUL TATE

On Dec. 31, 1992, Europe will become a unified market, free of internal trade and tariff barriers, and linked together by an expanding web of electronic trading links. At least that's the plan of the European Commission in Brussels, which represents 12 of Europe's major countries.

With an estimated GNP of over $4 trillion and a population of 320 million people, a single Europe would be one of the largest industrialized markets in the world, strongly supported by established economies and an infrastructure of internal trading links. Observers believe that many of the new trading links forged in preparation for 1992 will be electronic. Multinational network services, electronic data interchange (EDI) systems, and messaging, inquiry, and transaction networks will create a trading environment that will sustain the future European economy. This will be the foundation of a European "open system" for trade and commerce.

Yet some European IS managers, who are supposed to be key to creating this new Europe, are still approaching the 1992 deadline with skepticism and in a state of poor preparation.

A DATAMATION/Price Waterhouse pilot survey of 90 European IS managers in West Germany, the U.K., and France canvassed their attitudes on the 1992 transition, and found that three quarters of U.K. users and a third of French and German users expect 1992 to be a "nonevent" in IS terms for their companies.

Although some expect to make formal IS plans for 1992 in the next four years, a large number—half of U.K. and West German users—believe that such plans are unnecessary. Over 80% of U.K. and West German users do not even expect the new rules to delay the development of their key systems.

They do feel, however, that the IS industry in Europe will change, and that that change will be to their benefit. IS executives in all three countries predict a reduction in the number of IS suppliers. Also, over 90% of users expect 1992 to be good for them because they expect prices to drop due to the economies of scale or reductions in tariffs. They also expect that standardization will help reduce the complexity of their choices.

In fact, the proposed European standards, covering a range of technical, trading, and legal issues in many industry sectors, are already influencing the purchasing plans of these IS executives. The results show a likely boost for Unix and the OSI networking standards, which reflects the need for Europeans to use standard interfaces to overcome both supplier and national network incompatibilities.

French users stand out in the survey as being particularly conscious of the significance of 1992, partly because of the French government's extensive awareness campaigns. Most expect their IS choices to be influenced in all areas surveyed except database systems, and the vast majority have, or expect to make, formal IS plans geared to the 1992 deadline over the next few years. There is clear evidence that these plans will require considerable software changes for French users. Unlike U.K. and West German IS executives, most French users expect their choice of software packages to be strongly influenced by European standards.

These kinds of recent market shifts at both a national and European level, combined with the urge to benefit from pan-European economies of scale in manufacturing and distribution, are sending IS vendors in Europe into a frenzy of strategic mergers and acquisitions, as exemplified by Nokia's takeover of Ericsson Information Systems and the merger of U.K. services companies Systems Designers and Scicon. U.S. companies such as IBM and Digital Equipment Corp., meanwhile, are embarking on aggressive marketing drives to promote their systems integration products and services, as well as their willingness to work with other companies in major deals.

But perhaps the most ambitious 1992-inspired union thus far is between 22 European telephone authorities. Next month, in an unprecedented move, they will launch a new joint company called Managed Data Network Services (MDNS), which will provide a pan-European one-stop shop for managed network services. Based in the Netherlands, MDNS will develop and sell cross-border leased lines along with network management services. Based on X.25 protocols and linking each national packet switched network, the new service is expected to boost OSI standards in Europe.

In the meanwhile, network users, whether they are industrial firms or network providers such as GEISCO, should find that the costs of value-added services and some intra-European networking will be greatly reduced.

It would seem that in the key network services sector at least, the survey respondents may start reaping the benefits of 1992-induced price reductions somewhat earlier than they may have anticipated.

The Influence of 1992 on IS Purchasing

French and German companies most expect their buying choices of key products to be influenced by emerging European standards in the next four years.

	Operating Systems	Packages	Database Systems	Software Dev. Tools	Suppliers
(by percent)	%	%	%	%	%
FRANCE	72	72	28	50	56
GERMANY	100	13	67	27	7
U.K.	29	32	19	20	24

Source: DATAMATION/Price Waterhouse.

Sector Performance Update: Spotlight on Industry

Good news dominates reports from three industrial sectors: electronics, industrial, and metals.

BY MADELINE FRANCHI

In the electronics sector, growth in 1988 was the best since 1984. Renewed equipment investment by business, increased opportunities for exports, and the upward momentum of the business cycle propelled electronics industry growth this year. To keep pace with the influx of new orders, electronic manufacturers have expanded their output levels about 8% so far in 1988. Electronics sales climbed almost 11% through July compared with the same period last year. Shipments are forecast to total $258 billion this year, compared with $212 billion in 1984.

For many companies, this rebound has meant a return to increased profitability. For IS in the electronics sector, the news potentially translates into more dollars for staff and equipment. During 1988, the electronic and electrical machinery industry invested roughly $18.2 billion in new plants and equipment, which represents a 19% hike over the spending rate in 1987.

The industrial machinery and automotive sector is also doing well. Nonelectrical machinery sales were up about 16% compared with 1987. This increase encompasses factory shipments of general industrial, farm, and construction machinery.

A big boost is the booming export market. In order to increase capacity to meet the demand, machinery makers invested roughly $15 billion this year in new plants and manufacturing equipment.

The domestic auto industry is benefiting from less import competition due to the weaker dollar. In the first seven months of the year, domestic auto sales rose 8% above sales for the same period last year. Sales of light trucks continue to boom. Through July of this year, sales of class I and class II trucks were 9.6% higher than a year ago. At this pace, year-end sales are expected to advance 8.6% to nearly 4.7 million units, making 1988 the fifth consecutive year of record-breaking growth in truck sales.

However, don't look for the auto manufacturers to put any extra dollars into their equipment budgets right now. They spent billions in 1984 and 1985, so growth in their capital spending will be squeezed for some time to come. The industry's expenditures for new plants and equipment are expected to shrink about 5% in 1988 compared to a year ago.

Metal products are also rebounding. Industrial production of fabricated metal products expanded 10% from August 1987 to August 1988, and more gains are expected. The combined forces of a declining U.S. dollar and strong foreign economies produced a strong demand for U.S. capital goods, including forgings, stampings, and structural metal products.

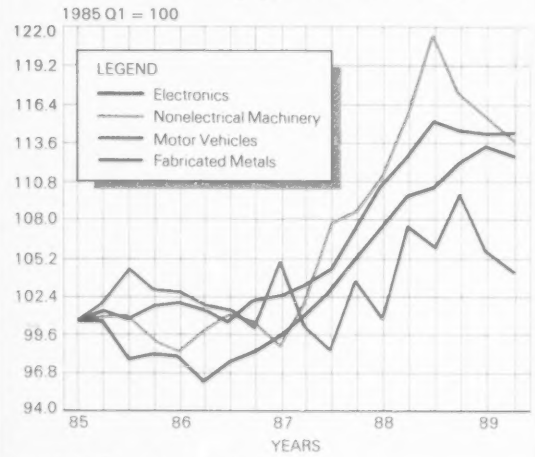
Capacity utilization in this industry hit 84.4% in August, the highest monthly rate since October 1979. Metal manufacturers are now investing in new plants and equipment to keep their factories and information processing needs running smoothly. If spending continues as expected, this industry will have sunk about $4.4 billion into capital stock this year.

Once each quarter, Information Economics will report on the health of various U.S. economic sectors. Future issues will cover the action in food and beverage, pharmaceuticals, petroleum and petrochemicals, process industries, retail, utilities, banking, insurance, health care, transportation, and government.

More economic information can be obtained from Cahners Economics Department, 275 Washington St., Newton, MA 02158, (617) 964-3030.

Industrial Production Index

The sharp updraft in production is coming to an end: 1989 numbers may approach late-'87 levels.



Source: Federal Reserve P... and Cahners Economics

Economic Spotlight Tidbits

Gauge your industry's health by following these economic indicators (in $ billions).

	Actual 1987	Forecast 1988
Electronics*		
Shipments	$235	$258
Average capacity utilization	75.4%	77.4%
Plant/Equip. spending	$16.6	$18.2
Nonelectronic machinery**		
Shipments	$156	$180
Average capacity utilization	74.5%	80.0%
Plant/Equip. spending	$13.9	$15.0
Motor vehicles		
Auto shipments (millions/units)	7.1	7.6
Average capacity utilization	79.2%	80.3%
Plant/Equip. spending	$11.9	$11.3
Fabricated Metals		
Shipments	$135	$144
Average capacity utilization	78.2%	83.1%
Plant/Equip. spending	$4.0	$4.4

*Includes computers and office equipment, tv and radio, communications equipment, electronic components, and scientific and engineering instruments
**Excludes computer and office equipment shipments
Source: Commerce Dept., Federal Reserve, Motor Vehicle Mfrs. Assn., Cahners Econ.